

# Advances in Modelling Salt Stock Deposition of Nuclear Wastes

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## *Abstract*

Rock salt is one potential host rock for the High-Level radioactive nuclear Waste (HLW) repository. Saline water in the rock salt is supposed to flow through the engineered barrier system and directly contact the HLW container. Corrosion, oxidation and reactive transport processes occur. Chemical reactions (e.g. dissolution, precipitation) can change the material properties of the porous media (for instance, porosity, hydraulic permeability, relative permeability and mechanical strength). The mobility of nuclides depends highly on the chemical composition of the saline water solution. In addition, the nuclear decay set heat free and the temperature field in the near field varies with time, which consequently affects the chemical reactions in the near field. Numerical simulation is one important tool to better understand the complex processes in the near field. In this work, the redox process of solid material  $\text{UO}_2(\text{s})$  in porous media is simulated using the FEM numerical simulator GeoSys/Rockflow + ChemApp. With the intrusion of saline water with dissolved oxygen  $[\text{O}_2(\text{aq})]$ , the  $\text{UO}_2(\text{s})$  is dissolved with the time and uranium is thus transported in the groundwater.